


Remarks

The Examiner is thanked for the Office Action mailed 08/27/2002 and the allowance of claims 49-51 and 55. A Notice of Appeal is enclosed. Claims 2-6, 8-14, 17, 49-52 and 55-57 are pending in the present application. Claim 13 is amended solely to to correct an obvious typographical error.

The Examiner is also thanked for the courtesy of a telephone interview with myself and one of the inventors, Dr. Peter Webb, on 11/28/2002. During the interview the enablement rejection of claim 6 was discussed and how the specification discloses that a target drive pattern need not be present (as distinguished from a target array pattern). The Examiner was concerned that it appeared inconsistent to refer to a "corrected drive pattern" in claim 6 when there was no "drive pattern". Also, with regard to the anticipation rejection of claims 2-5, 8-14, 17, 52, 56, 57 based on Blanchard (WO 98/41521), reasons were discussed as to why Blanchard's camera would not examine the dispensing head as alleged by the Examiner. The additional limitation of claim 13 was further generally discussed. The Examiner suggested a response would be given consideration in which claim 6 was amended to refer to "actual drive pattern" in place of "corrected drive pattern", and in which the operation of Blanchard's camera was discussed. Accordingly, the foregoing amendment has been made to claim 6 and elsewhere in the claims for consistency, and the operation of Blanchard's camera is discussed below.

Turning now to the first rejection of the Action (rejection of claim 6 as not enabled), as discussed during the telephone interview, the target array pattern is present in claim 6 from which the actual drive pattern may be derived. Such a procedure is described in the present application at, for example, page 17, lines 10-18. As discussed during the telephone interview, it is believed that amending claim 6 to refer to "actual drive pattern" rather than "corrected drive pattern" eliminates any confusion as to how there might be a "corrected drive pattern" without a "drive pattern". Accordingly, it is believed that claim 6, as amended, is now in condition for allowance also.



Turning now to the only other rejection in the Action (rejection of claims 2-5, 8-14, 17, 52, 56, 57 as anticipated by Blanchard), the distinctions between the rejected claims and Blanchard will now be discussed. The Examiner based this rejection on Blanchard's camera also viewing the dispensing head to determine an operating parameter for correction. As discussed during the interview, Blanchard's camera is positioned in his apparatus such that it cannot view the dispensing head. In particular, Blanchard's Fig. 5 shows the synthesis system, Fig. 6 shows the inkjet print heads used in the system of Fig. 5, while Fig. 8 shows "an alignment unit" of Fig. 5 (see page 9, lines 11-19). The "print head assembly 24" of Fig. 6 "comprises two print heads 36, mounted within an aluminum block 38" (page 58, line 29). The print heads "are directed upwardly, to deposit liquid on a substrate that is positioned over the print heads" (page 58, lines 10-12). On the other hand the "Alignment unit 26 comprises a marker 50 and a camera 52", and the marker "comprises a diamond tip or point that can be raised or lowered in response to activation and deactivation by solenoid 54" to contact and mark an "adjacent substrate" (page 63, lines 6-17). Note that from Fig. 5 the marker 50 and the camera 52 face upwardly (in the same direction as the print heads of print head assembly in that Fig. 5). Also, this would be consistent with the marker being "raised or lowered" into contact with the substrate. Furthermore, after a mark is made on the substrate it can then be "positioned over lens 60" to have its position determined (page 64, lines 6-9).

Thus, from the above, it is apparent that Blanchard's print heads and camera both face upwardly and the camera does not (and indeed, cannot) view the print heads. For this reason alone (Blanchard's camera can not view the print head, as alleged), the anticipation rejection of claims 2-5, 8-14, 17, 52, 56, 57 should be withdrawn.

In addition to the above, the Examiner postulates that Blanchard's calibration of the substrate relative to the scanning transport and print head assembly (as described on page 23, lines 23-26) is impossible unless all three are viewed. This is incorrect. As pointed out, Blanchard scores the substrate then uses the camera to observe the scored position (which is fine when all one wants to do is to ensure the substrate is re-positioned at the same location between each *in situ* synthesis cycle as Blanchard describes in detail on page 72, lines 3-17). That is, if one assumes an

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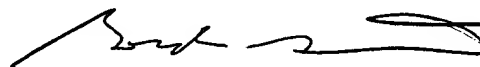
absolute relative position of print head assembly 24 and alignment unit 26 (which includes the camera 52) by virtue of their being "mounted, for example, on a base 24" (page 56, lines 28-29), then by initially creating marks on a substrate with alignment unit 26 one obtains a position relative to print head assembly 24 which is re-established when the marks are viewed by camera 52 of the alignment unit 26. Thus, Blanchard's camera 52 does not necessarily view the print head assembly 24 and the anticipation rejection based on Blanchard should be withdrawn for this reason also.

Thus, for the reasons discussed the Examiner has not satisfied his burden of establishing that every element of the rejected claims is found in Blanchard, and the rejection based on that reference should now be withdrawn.

In addition to the above, claim 13 limits the operating parameter to one which "is examined by viewing the droplet pattern previously dispensed from the head", The Examiner has not alleged that such a feature is disclosed in Blanchard and accordingly the rejection of claim 13 should be withdrawn for this additional reason.

In view of the amendments and discussion, it is submitted that in addition to allowed claims 49, 51-55, claims 2-6, 8-14, 17, 52, 56, 57 are now also in condition for allowance. If the Examiner is of the view that there are any outstanding issues, he is invited to call Gordon Stewart at (650)485-2386.

Respectfully submitted,



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APPENDIXVERSION WITH MARKINGS TO SHOW CHANGES MADE

2. (TWICE AMENDED) A method according to claim 10, additionally comprising operating the deposition apparatus according to the ~~corrected drive pattern~~actual drive pattern.
3. A method according to claim 10 wherein the probes are DNA or RNA probes.
4. A method according to claim 10 additionally comprising saving the target drive pattern in a memory of the deposition apparatus.
5. (TWICE AMENDED) A method according to claim 10 additionally comprising saving the target drive pattern in a memory of the deposition apparatus, and wherein the ~~corrected drive pattern~~actual drive pattern is saved in the memory.
6. (TWICE AMENDED) A method according to claim 10 wherein the ~~corrected drive pattern~~actual drive pattern is derived without obtaining a target drive pattern.
8. (THREE TIMES AMENDED) A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:
 - (a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;
 - (b) when an error is detected deriving, based on the error, a ~~corrected drive pattern~~an actual drive pattern different from the target drive pattern such that use of the ~~corrected drive pattern~~actual drive pattern results in a reduced discrepancy between the target and actual array patterns; and

(c) operating the deposition apparatus according to the ~~corrected drive pattern~~actual drive pattern so as to fabricate the array;

wherein:

the deposition apparatus includes a dispensing head to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the target drive pattern controls operation of the transport system; and

the operating parameter is the position of the dispensing head, which is examined by viewing the dispensing head.

9. A method according to claim 8 wherein the operating parameter is examined by viewing a fiducial mark on the dispensing head.

10. (TWICE AMENDED) A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

(a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;

(b) when an error is detected deriving, based on the error, a ~~corrected drive pattern~~an actual drive pattern different from the target drive pattern such that use of the ~~corrected drive pattern~~actual drive pattern results in a reduced discrepancy between the target and actual array patterns; and

(c) operating the deposition apparatus according to the ~~corrected drive pattern~~actual drive pattern so as to fabricate the array;

wherein:

the deposition apparatus includes a dispensing head with multiple nozzles to dispense fluid droplets containing the probes or probe precursors, and a transport

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system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the drive pattern controls operation of the transport system;

the at least one operating parameter is the position of the substrate or dispensing head, or orientation of a nozzle, and is examined by viewing the dispensing head, or nozzle, or a droplet pattern previously dispensed from the head.

11. (TWICE AMENDED) A method according to claim 4 additionally comprising saving the target drive pattern in a memory of the deposition apparatus, and wherein the ~~corrected drive pattern~~ actual drive pattern is saved in the memory, prior to operating the dispensing head and transport system to form the array.

12. (TWICE AMENDED) A method according to claim 4 additionally comprising saving the target drive pattern in a memory of the deposition apparatus, and wherein the ~~corrected drive pattern~~ actual drive pattern is derived by modifying, based on the detected error, instructions to at least one deposition apparatus component based on the target drive pattern during operation of the dispensing head and transport system to form the array.

13. (TWICE AMENDED) A method according to claim 10 wherein the at least one operating parameter is ~~examined~~ is examined by viewing the droplet pattern previously dispensed from the head.

14. A method according to claim 10 wherein the at least one operating parameter is a position of the dispensing head.

17. (TWICE AMENDED) A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

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- (a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;
 - (b) when an error is detected deriving, based on the error, a ~~corrected drive pattern~~ an actual drive pattern different from the target drive pattern such that use of the ~~corrected drive pattern~~ actual drive pattern results in a reduced discrepancy between the target and actual array patterns; and
 - (c) operating the deposition apparatus according to the ~~corrected drive pattern~~ actual drive pattern so as to fabricate the array;
- wherein:

the deposition apparatus includes a dispensing head with multiple nozzles to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the drive pattern controls operation of the transport system;

and wherein the at least one parameter is a position of a nozzle which is examined by viewing the nozzle, or a droplet pattern previously dispensed from the head.

49. (TWICE AMENDED) A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

- (a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;
- (b) when an error is detected deriving, based on the error, a ~~corrected drive pattern~~ an actual drive pattern different from the target drive pattern such that use of the ~~corrected drive pattern~~ actual drive pattern results in a reduced discrepancy between the target and actual array patterns; and

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(c) operating the deposition apparatus according to the ~~corrected drive pattern~~actual drive pattern so as to fabricate the array;

wherein the operating parameter is a fluid volume dispensed by the deposition apparatus.

50. (TWICE AMENDED) A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

(a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;

(b) when an error is detected deriving, based on the error, a ~~corrected drive pattern~~an actual drive pattern different from the target drive pattern such that use of the ~~corrected drive pattern~~actual drive pattern results in a reduced discrepancy between the target and actual array patterns; and

(c) operating the deposition apparatus according to the ~~corrected drive pattern~~actual drive pattern so as to fabricate the array;

wherein the operating parameter is a position of a component which varies due to thermal expansion.

51. (TWICE AMENDED) A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

(a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;

(b) when an error is detected deriving, based on the error, a ~~corrected drive pattern~~an actual drive pattern different from the target drive pattern such that use of

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the ~~corrected drive pattern~~actual drive pattern results in a reduced discrepancy between the target and actual array patterns; and

(c) operating the deposition apparatus according to the ~~corrected drive pattern~~actual drive pattern so as to fabricate the array;

wherein:

the deposition apparatus includes a dispensing head to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

the apparatus further includes an encoder to provide data on the location of the substrate or head; and

the at least one operating parameter is an encoder error.

52. (TWICE AMENDED) A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

(a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;

(b) when an error is detected deriving, based on the error, a ~~corrected drive pattern~~an actual drive pattern different from the target drive pattern such that use of the ~~corrected drive pattern~~actual drive pattern results in a reduced discrepancy between the target and actual array patterns; and

(c) operating the deposition apparatus according to the ~~corrected drive pattern~~actual drive pattern so as to fabricate the array;

wherein:

the deposition apparatus includes a dispensing head with multiple nozzles to dispense fluid droplets containing the probes or probe precursors, and a transport system to move at least one of the dispensing head and substrate relative to the other as the droplets are dispensed from the head, so as to form the array;

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the drive pattern controls operation of the transport system;

the operating parameter is the position of the dispensing head, or orientation of a nozzle, and is examined by viewing the dispensing head, or nozzle.

55. (AMENDED) A method according to claim 49 wherein the deposition apparatus comprises multiple jets for dispensing droplets, and wherein the ~~corrected drive pattern~~actual drive pattern comprises an instruction to switch to a different jet when a deviation from nominal volume is encountered for one jet which is more than a predetermined tolerance.

56. (TWICE AMENDED) A method of fabricating an addressable array of biopolymer probes on a substrate according to a target array pattern using a deposition apparatus which, when operated according to a target drive pattern based on nominal operating parameters of the apparatus, provides the probes on the substrate in the target array pattern, the method comprising:

- (a) examining at least one operating parameter for an error from a nominal value which error will result in use of the target drive pattern producing a discrepancy between the target array pattern and an actual array pattern deposited;
 - (b) when an error is detected deriving, based on the error, a ~~corrected drive pattern~~an actual drive pattern different from the target drive pattern such that use of the ~~corrected drive pattern~~actual drive pattern results in a reduced discrepancy between the target and actual array patterns; and
 - (c) operating the deposition apparatus according to the ~~corrected drive pattern~~actual drive pattern so as to fabricate the array;
- wherein the same error affects less than all of the array features.

57. A method according to claim 10 wherein the same error affects less than all of the array features.

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